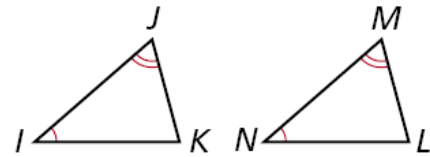


Attendance Problems.

1. Name all sides and angles of $\triangle FGH$.

2. What is true about $\angle K$ and $\angle L$? Explain why.



3. What does it mean for two segments to be congruent?

- I can use properties of congruent triangles.
- I can prove triangles congruent by using the definition of congruence.

Vocabulary		
corresponding angles	corresponding sides	congruent polygons

CC.9-12.G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures.

Geometric figures are congruent if they are the same size and shape.

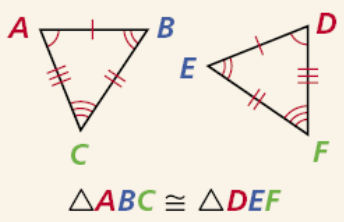
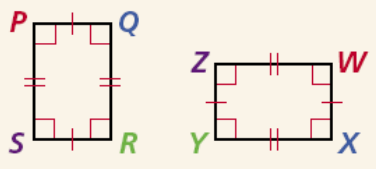
Corresponding angles and **corresponding sides** are in the same position in polygons with an equal number of sides.

Two polygons are **congruent polygons** if and only if their corresponding sides are congruent. Thus triangles that are the same size and shape are congruent.

Q: What quantity is represented by three congruent dirty trees?

A: 99.

Properties of Congruent Polygons

DIAGRAM	CORRESPONDING ANGLES	CORRESPONDING SIDES
 <p>$\triangle ABC \cong \triangle DEF$</p>	$\angle A \cong \angle D$ $\angle B \cong \angle E$ $\angle C \cong \angle F$	$\overline{AB} \cong \overline{DE}$ $\overline{BC} \cong \overline{EF}$ $\overline{AC} \cong \overline{DF}$
 <p>polygon $PQRS \cong$ polygon $WXYZ$</p>	$\angle P \cong \angle W$ $\angle Q \cong \angle X$ $\angle R \cong \angle Y$ $\angle S \cong \angle Z$	$\overline{PQ} \cong \overline{WX}$ $\overline{QR} \cong \overline{XY}$ $\overline{RS} \cong \overline{YZ}$ $\overline{PS} \cong \overline{WZ}$

Helpful Hint

Two vertices that are the endpoints of a side are called consecutive vertices.

For example, P and Q are consecutive vertices.

To name a polygon, write the vertices in consecutive order. For example, you can name polygon $PQRS$ as $QRSP$ or $SRQP$, but **not** as $PRQS$.

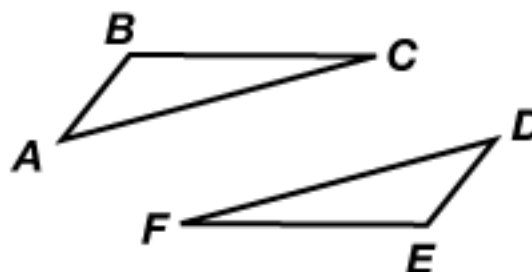
In a congruence statement, the order of the vertices indicates the corresponding parts.

Helpful Hint

When you write a statement such as $\angle ABC \cong \angle DEF$, you are also stating which parts are congruent.

Video Example 1. $\triangle ABC \cong \triangle DEF$

Identify all pairs of congruent corresponding parts.



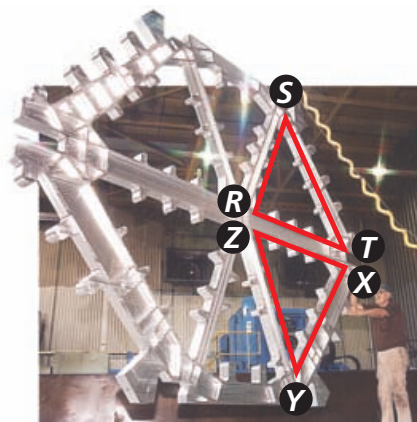
1

Naming Congruent Corresponding Parts

$\triangle RST$ and $\triangle XYZ$ represent the triangles of the space station's support structure. If $\triangle RST \cong \triangle XYZ$, identify all pairs of congruent corresponding parts.

Angles: $\angle R \cong \angle X$, $\angle S \cong \angle Y$, $\angle T \cong \angle Z$

Sides: $\overline{RS} \cong \overline{XY}$, $\overline{ST} \cong \overline{YZ}$, $\overline{RT} \cong \overline{XZ}$



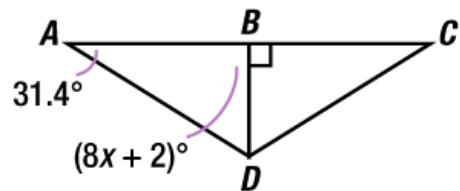
"He didn't run for reelection. 'Politics brings you into contact with all the people you'd give anything to avoid,' he said. 'I'm staying home.'" -- *Garrison Keillor, Lake Wobegone Days*

Example 1. **Given:** $\triangle PQR \cong \triangle STW$ Identify all pairs of congruent corresponding parts.

4. Guided Practice. If polygon $LMNP \cong$ polygon $EFGH$, identify all pairs of corresponding congruent parts.

Video Example 2. $\triangle ABD \cong \triangle CBD$.

A. Find the value of x .

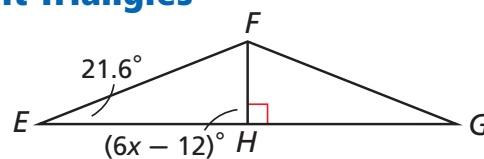


B. Find $m\angle BDC$.

2

Using Corresponding Parts of Congruent Triangles

Given: $\triangle EFH \cong \triangle GFH$



A Find the value of x .

$\angle FHE$ and $\angle FHG$ are rt. \angle s.

$$\angle FHE \cong \angle FHG$$

$$m\angle FHE = m\angle FHG$$

$$(6x - 12)^\circ = 90^\circ$$

$$6x = 102$$

$$x = 17$$

Def. of \perp lines

Rt. $\angle \cong$ Thm.

Def. of $\cong \angle$ s

Substitute values for $m\angle FHE$ and $m\angle FHG$.

Add 12 to both sides.

Divide both sides by 6.

B Find $m\angle GFH$.

$$m\angle EFH + m\angle FHE + m\angle E = 180^\circ$$

$$m\angle EFH + 90 + 21.6 = 180$$

$$m\angle EFH + 111.6 = 180$$

$$m\angle EFH = 68.4$$

$$\angle GFH \cong \angle EFH$$

$$m\angle GFH = m\angle EFH$$

$$m\angle GFH = 68.4^\circ$$

\triangle Sum Thm.

Substitute values for $m\angle FHE$ and $m\angle E$.

Simplify.

Subtract 111.6 from both sides.

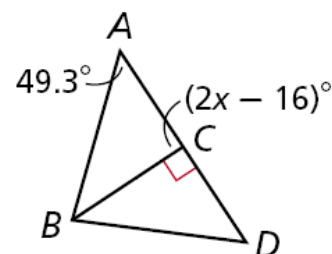
Corr. \angle s of $\cong \triangle$ s are \cong .

Def. of $\cong \angle$ s

Trans. Prop. of $=$

Example 2. $\triangle ABC \cong \triangle DBC$.

A. Find the value of x .



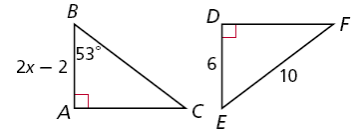
B. Find $m\angle DBC$.

Geometry 4-4 Study Guide: Congruent Triangles (pp 239-245)

Page 6 of 13

Guided Practice. $\triangle ABC \cong \triangle DEF$.

5. Find the value of x .



6. Find $m\angle F$.

Video Example 3.

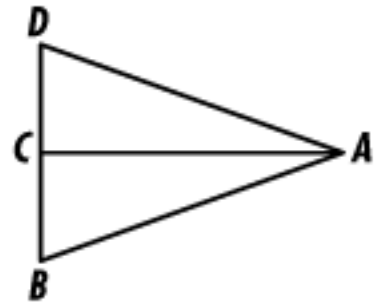
$\angle ACD$ & $\angle ACB$ are right \angle s.

C is the midpoint of \overline{BD} .

Given: $\overline{AD} \cong \overline{AB}$

\overline{AC} bisects $\angle A$.

Prove: $\triangle ACD \cong \triangle ACB$



3 Proving Triangles Congruent

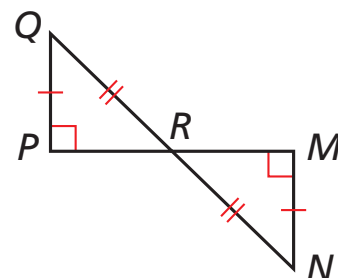
Given: $\angle P$ and $\angle M$ are right angles.

R is the midpoint of \overline{PM} .

$\overline{PQ} \cong \overline{MN}$, $\overline{QR} \cong \overline{NR}$

Prove: $\triangle PQR \cong \triangle MNR$

Proof:



Statements	Reasons
1. $\angle P$ and $\angle M$ are rt. \angle s	1. Given
2. $\angle P \cong \angle M$	2. Rt. $\angle \cong$ Thm.
3. $\angle PRQ \cong \angle MRN$	3. Vert. \angle s Thm.
4. $\angle Q \cong \angle N$	4. Third \angle Thm.
5. R is the mdpt. of \overline{PM} .	5. Given
6. $\overline{PR} \cong \overline{MR}$	6. Def. of mdpt.
7. $\overline{PQ} \cong \overline{MN}$; $\overline{QR} \cong \overline{NR}$	7. Given
8. $\triangle PQR \cong \triangle MNR$	8. Def. of $\cong \triangle$

Example 3.

$\angle YWX$ & $\angle YWZ$ are right angles.

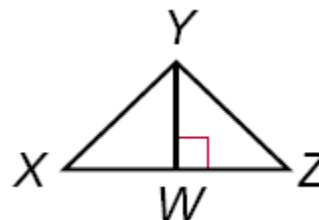
\overline{YW} bisects $\angle XYZ$.

Given:

W is the midpoint of \overline{XZ} .

$\overline{XY} \cong \overline{YZ}$.

Prove: $\triangle XYW \cong \triangle ZYW$



7. Guided Practice.

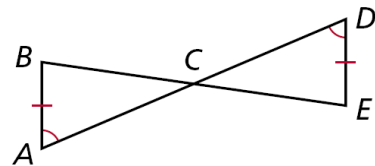
\overline{AD} bisects \overline{BE} .

Given: \overline{BE} bisects \overline{AD} .

$\overline{AB} \cong \overline{DE}$

$\angle A \cong \angle D$

Prove: $\triangle ABC \cong \triangle DEC$



Video Example 4.

$$\overline{AD} \perp \overline{DC}$$

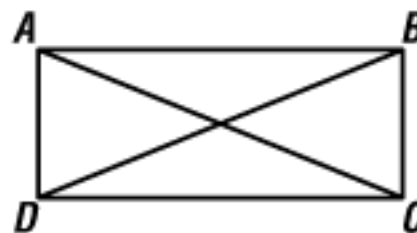
$$\overline{BC} \perp \overline{DC}$$

Given: $\angle DAC \cong \angle CBD$

$$\overline{AD} \cong \overline{BC}$$

$$\overline{BD} \cong \overline{AC}$$

Prove: $\triangle ACD \cong \triangle BDC$



4 Engineering Application

The bars that give structural support to a roller coaster form triangles. Since the angle measures and the lengths of the corresponding sides are the same, the triangles are congruent.

Given: $\overline{JK} \perp \overline{KL}$, $\overline{ML} \perp \overline{KL}$, $\angle K LJ \cong \angle L KM$,
 $\overline{JK} \cong \overline{ML}$, $\overline{JL} \cong \overline{MK}$

Prove: $\triangle JKL \cong \triangle MLK$

Proof:



Statements	Reasons
1. $\overline{JK} \perp \overline{KL}$, $\overline{ML} \perp \overline{KL}$	1. Given
2. $\angle JKL$ and $\angle MLK$ are rt. \angle s.	2. Def. of \perp lines
3. $\angle JKL \cong \angle MLK$	3. Rt. $\angle \cong$ Thm.
4. $\angle K LJ \cong \angle L KM$	4. Given
5. $\angle K JL \cong \angle L MK$	5. Third \angle Thm.
6. $\overline{JK} \cong \overline{ML}$, $\overline{JL} \cong \overline{MK}$	6. Given
7. $\overline{KL} \cong \overline{LK}$	7. Reflex. Prop. of \cong
8. $\triangle JKL \cong \triangle MLK$	8. Def. of $\cong \triangle$

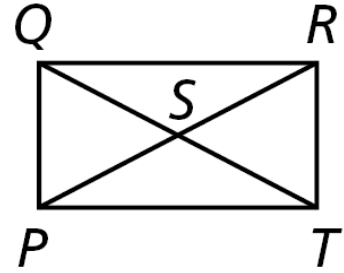
Example 4. The diagonal bars across a gate give it support. Since the angle measures and the lengths of the corresponding sides are the same, the triangles are congruent.

\overline{PR} and \overline{QT} bisect each other.

Given: $\angle PQS \cong \angle RTS$

$\overline{QP} \cong \overline{RT}$

Prove: $\triangle QPS \cong \triangle TRS$



8. Guided Practice.

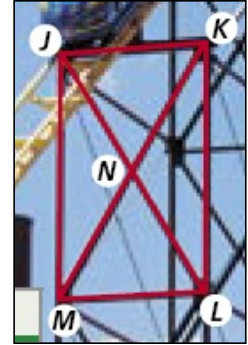
\overline{MK} bisects \overline{JL} .

Given: \overline{JL} bisects \overline{MK}

$\overline{JK} \cong \overline{ML}$

$\overline{JK} \parallel \overline{ML}$

Prove: $\triangle JKN \cong \triangle LMN$



4-4 Congruent triangles

- (p 243) 13, 15, 17-20, 24.
- 4A Ready to Go On pretest & posttests.